

Psychology of Play

Readings

Measuring Emotions

Eye Tracking

What is it?

Hardware that remotely tracks a person's pupil and point of gaze on a flat surface like a monitor screen or TV.

Measure:

Points and time of fixation, search patterns and gaze movements.

Eye Tracking Systems



- Tobii eye tracker
- SensoMotoric Instruments (SMI)

Things you need to know

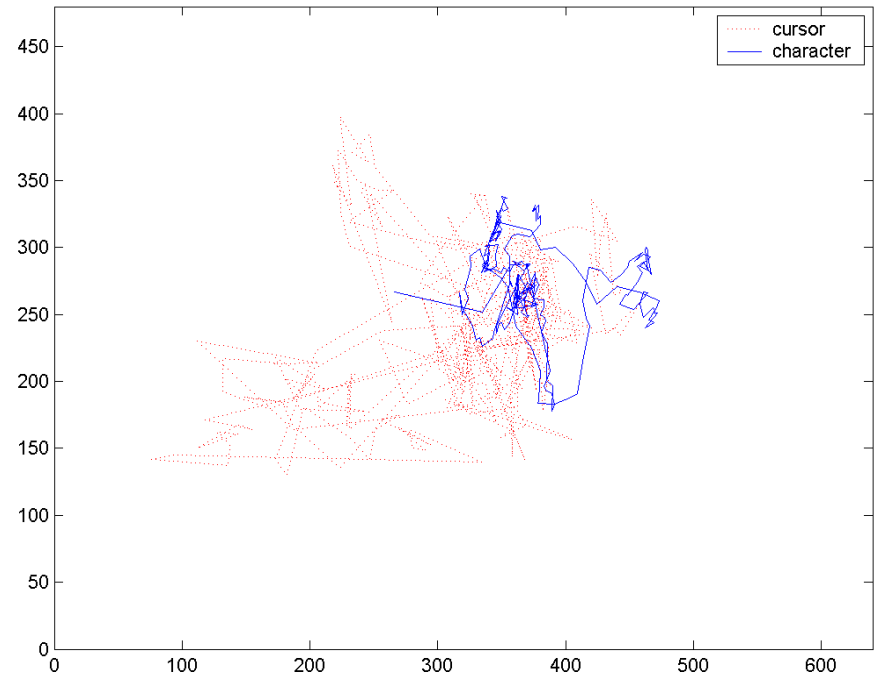
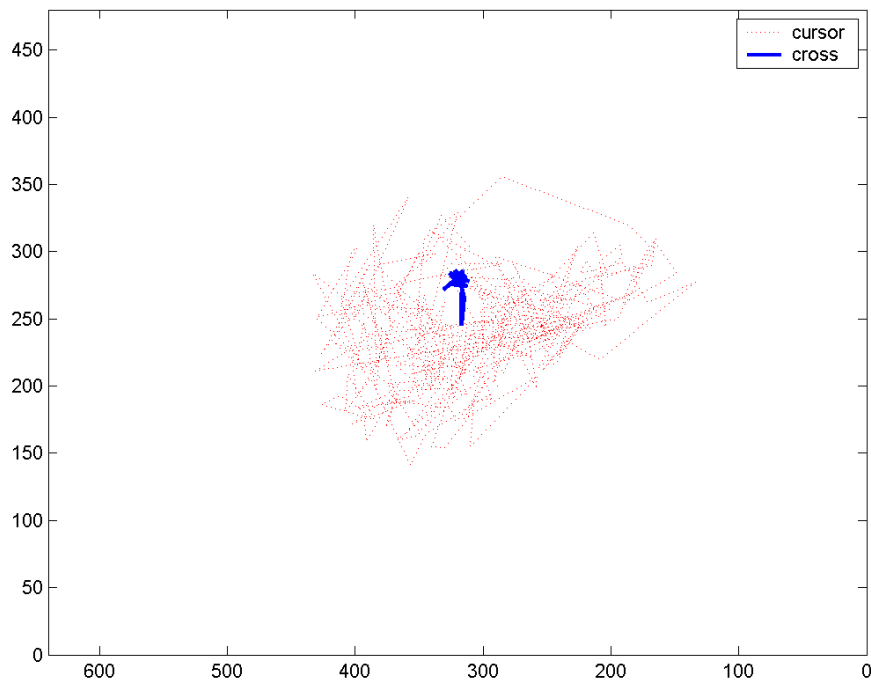
- Calibration
- Movement
- Restrictions in terms of demographics:
 - eye glasses
 - Dark eye lashes

Eye Tracking data in Half-Life 2



Visual Patterns

Halo II and Legacy of Kain



Magy Seif El-Nasr and Su Yan. Visual Attention in 3D Video Games. *ACE (ACM SIGCHI International Conference on Advances in Computer Entertainment Technology)*. Hollywood, June 14-16, 2006.

Biosensors

- ElectroEncephaloGram (EEG)
- ElectroMyoGraphy (EMG)
- Galvanic Skin Conductance
- Heart rate (EKG, InterBeatIntervals [IBI])
- Blood Volume

Equipment



Blood Volume
Pulse Sensor



EMG MysoScan
Sensor



Respiration
Sensor



Skin Conductance
Sensor



Temperature
Sensor

Biosensor data can be interpreted as:

- Arousal (heart rate)
- Positive or negative emotions, mental effort (EMG)
- Excitement, stressed, anxious (Skin conductance)

Electro Encephalogram (EEG)

- NeuroSky

(meditation and concentration)

~ \$ 800 (mindset + soft)



- Emotiv

(more channels, raw data)

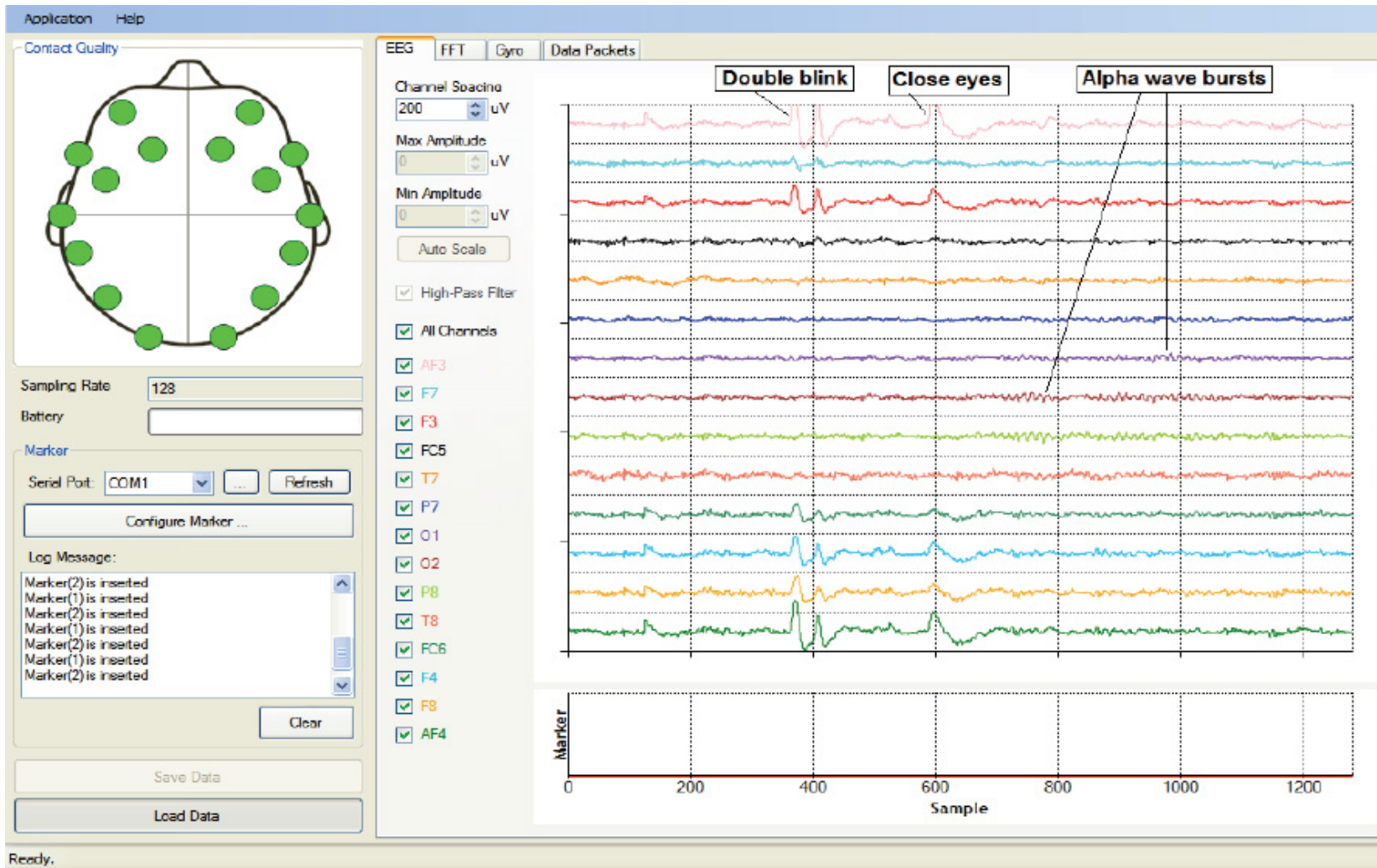
~ \$ 2,800 (mindset + soft)

http://www.youtube.com/watch?v=ZMiQx4Mhh_U

[http://www.youtube.com/watch?](http://www.youtube.com/watch?v=C4H-0eLVZAk&feature=PlayList&p=0035D51E18CB70C6&playnext=1&playnext_from=PL&index=16)

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Emotiv EEG data



Triangulation of Data

Linking different type of data obtain during a play session

- Cannot know the actual affect and valence without triangulation
- Bring the “what” (quantitative) and the “why” (qualitative) together

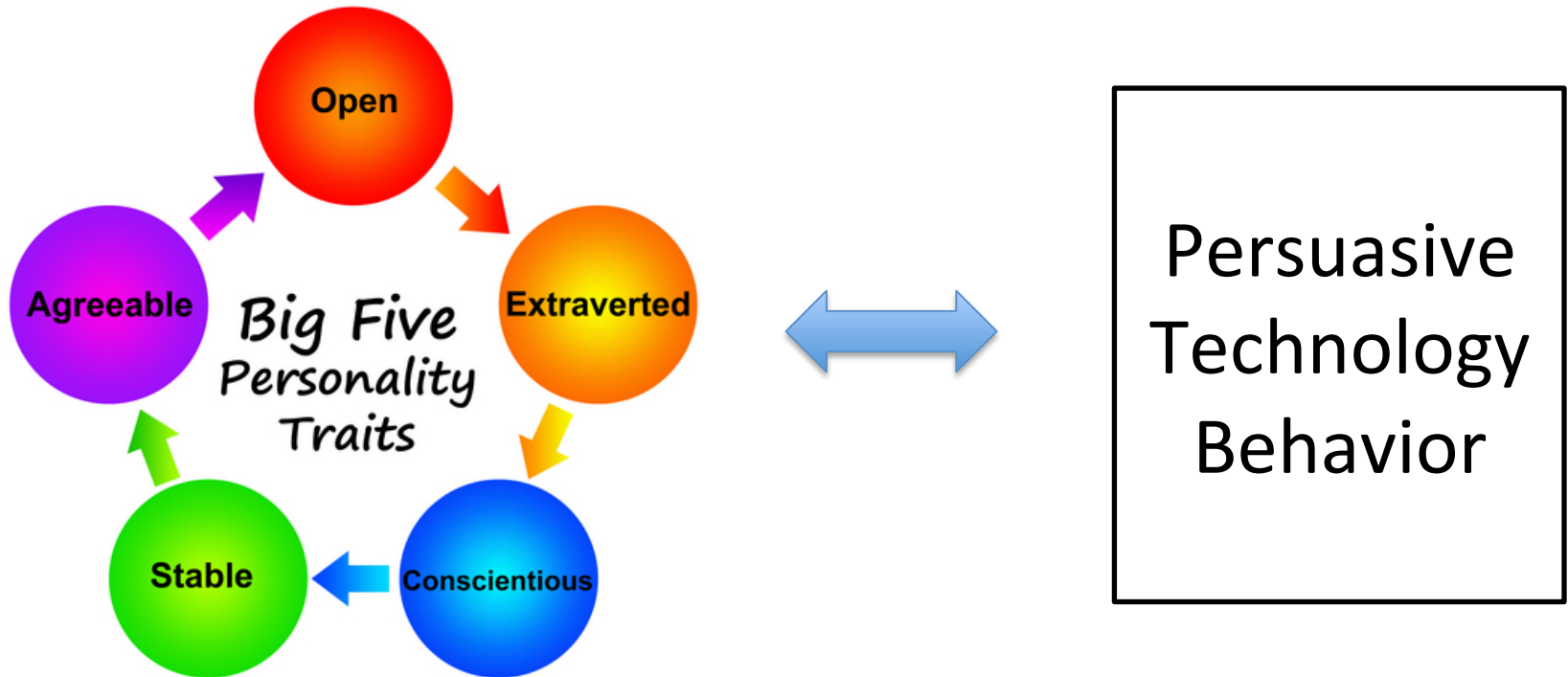
Important things to know

- Validated techniques for measuring arousal and valence
 - Skin conductance can be used to measure arousal
 - EKG + EMG can be used to measure Valence
- EMG by itself cannot differentiate between affect/emotion related events and others
- Report of emotions measured but not validated
- Not all emotions can be measured through these sensors
 - intrinsic pleasantness cannot be measured
 - Sadness, amusement cannot be measured

Media Psychology

- Time: Player generated, or Game World Generated
- Play space creates places of both
- Surprise, Curiosity, Suspense
 - Mario Kart
 - Silent Hill
- Role of learning in renewing emotions and experience
- Games are outcome based, control over emotions through choice

Personality and Persuasion



- What are the main points out of this article?

- neurotic personalities: they prefer working with others towards achieving goals, and have negative preference towards negative reinforcement

- Conscientious types: several negative correlations found all dealing with cooperative and competitive strategies leading them to conclude that conscientious personalities may be less likely to engage socially

- Agreeable people, do not prefer competitive strategy. There were a number of positive correlation between preference and negative as well as positive reinforcement, which suggests that this personality type may favor reward systems and reinforcements as a motivational tactic.

- For extrovert: many positive correlations between preferences and persuasive strategies suggesting that many strategies will appeal to extroverts, which may be due, as researchers explain, to “strong social networks and high levels of activity and engagement, leading to a desire to use technology to meet their goals.” Participants who were ranked higher in openness tend to favor negative reinforcement, extrinsic and intrinsic techniques.

| <i>Entertainment Medium</i> | <i>Film</i> | <i>Video Game</i> |
|---|---|---|
| Perceptual quality | High visual salience | Medium visual salience |
| Interactive control of: | | |
| Visual input (point of view) | None | Controlled by player via interface |
| Story events | None | Controlled by player via interface in interaction with game agency |
| Temporal progression | None | Controlled by player's explorative coping and time-out devices |
| Emotional significance of events | Controlled by film and characters | Emotional arousal is labeled according to the player's action skills and varies over time due to learning processes. Curiosity, sur- prise, and suspense are molded by repetitive interaction. |
| Supports mainly: | One viewing Mental and bodily simulations of cued events | Multiple games Concrete interactive simulations based on extensive cognitive mappings of space and the learn- ing of procedural schemas, lead- ing to motor reactions via inter- face |
| | Vicarious simulation of characters | First-person simulation of roles, leading to immersion in game world |
| Evaluation of viewer/ player performance | None | Yes, by game success, and eventually by score mechanism |

Psychology of Play

On a Different topic: Reward Systems

Rewards and Mechanics

Psychology: Classical and Operant Conditioning

Scheduling Rewards

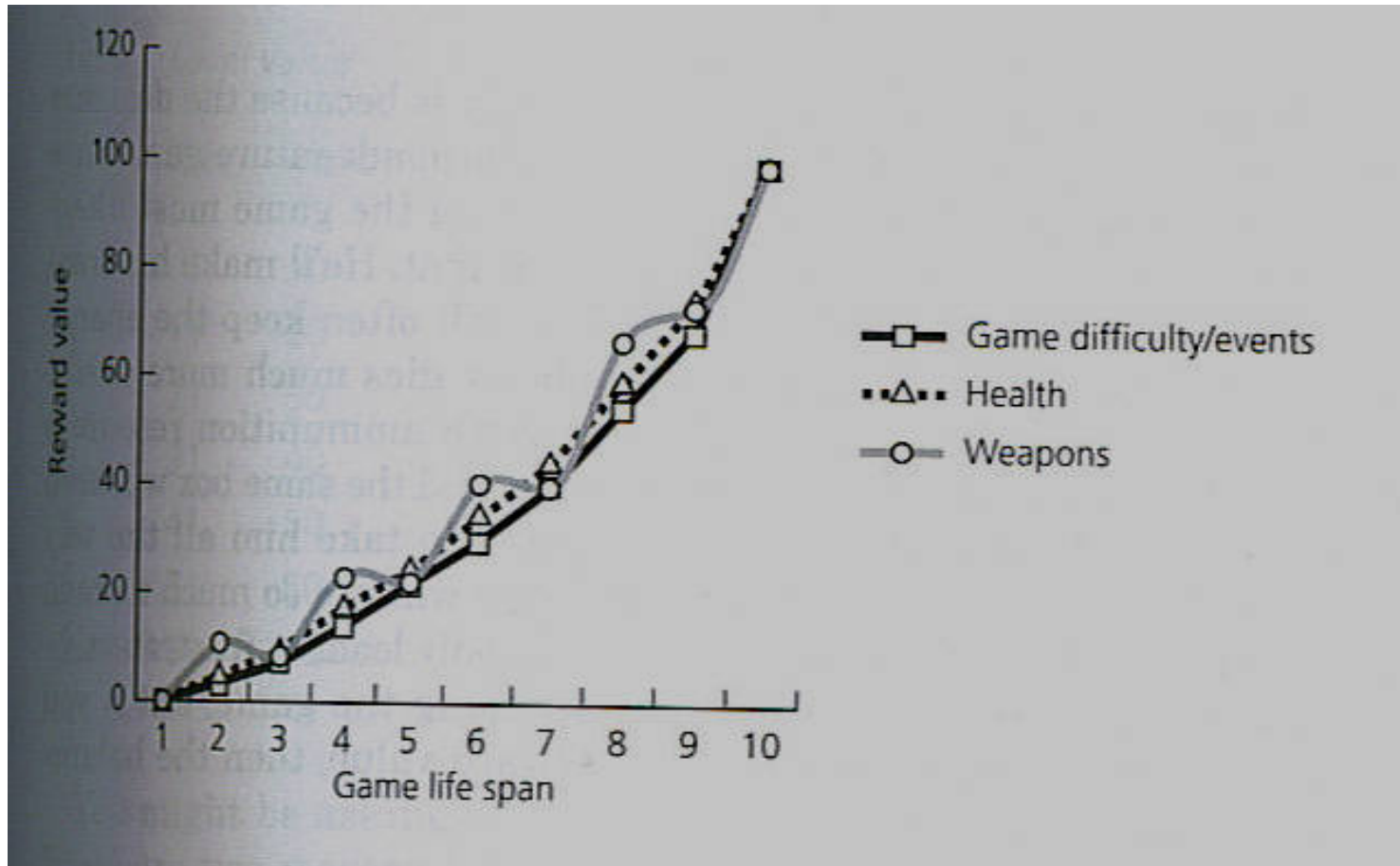
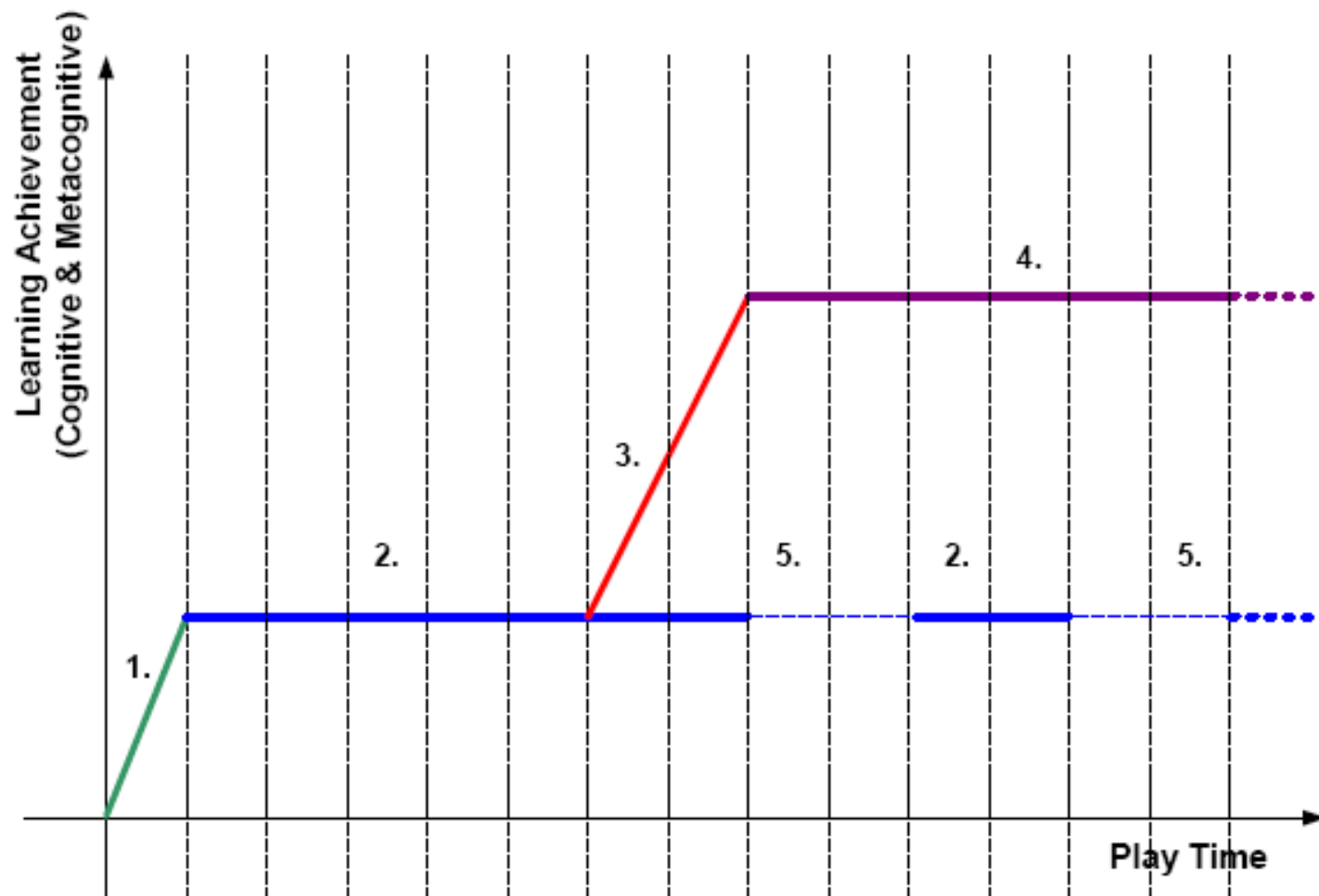


FIGURE 2.7. Delineating learning and application processes



- 1. Learning a feature of the mechanics
- 2. Using the feature as a tool in ordinary situations
- 3. Learning the effects of the influences of external factors
- 4. Using the feature as a tool under the influences of external factors
- - - 5. Temporary suspension of the usage of the feature in ordinary situations

Psychology of Behavior

Pavlov (1849 –1936) : Classical conditioning
(1890)

[http://www.youtube.com/watch?
v=hhqumfpuzI](http://www.youtube.com/watch?v=hhqumfpuzI)

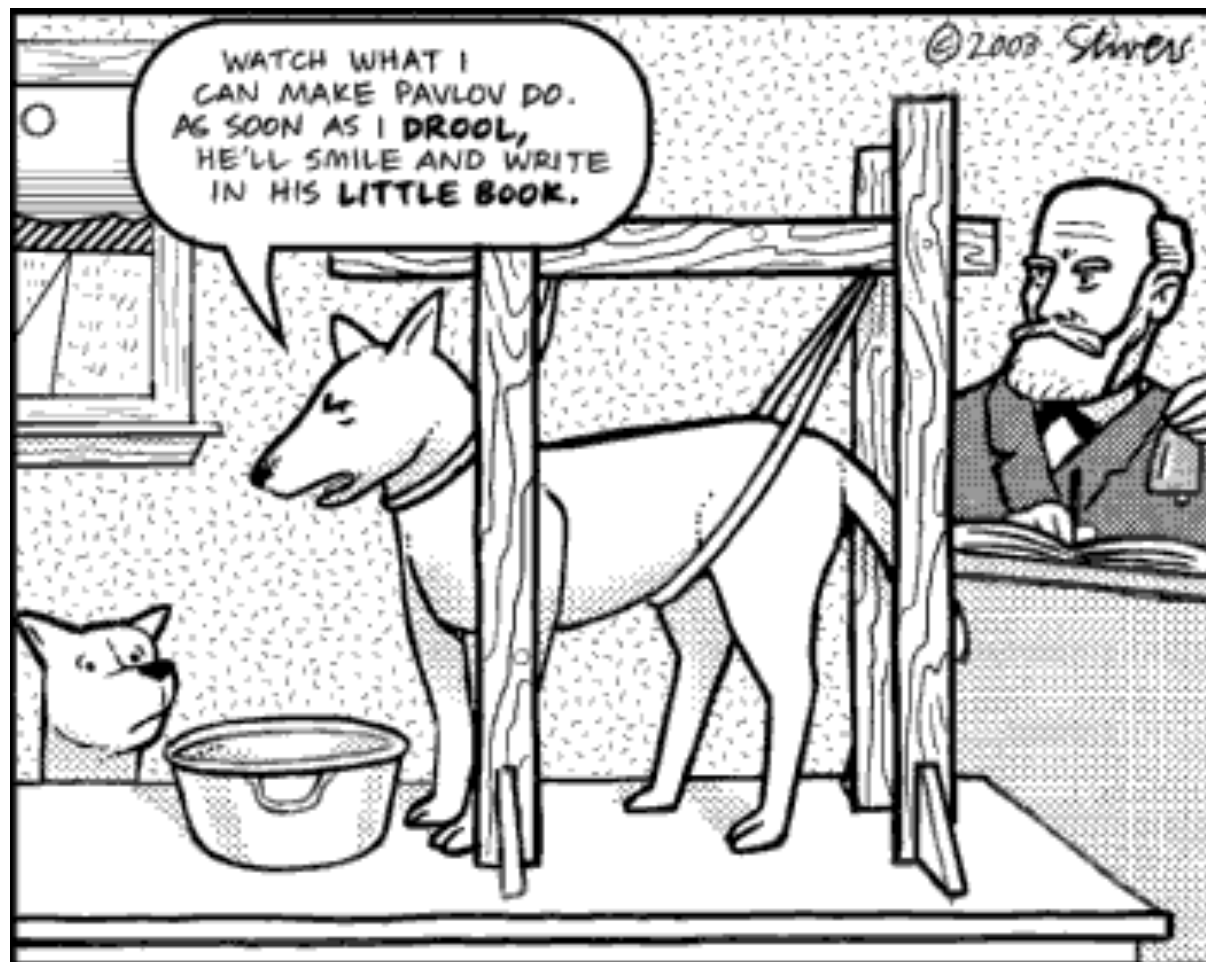
Psychology of Behavior

Pavlov (1849 –1936) : Classical conditioning
(1890)

UCS (food) -> salivation (UCR)

CS (Bell) paired with UCS (food)

CS -> salivation (CR)



WATCH WHAT I
CAN MAKE PAVLOV DO.
AS SOON AS I DROOL,
HE'LL SMILE AND WRITE
IN HIS LITTLE BOOK.

© 2003 Stivers

Psychology of Behavior

Thorndike (1898): Instrumental conditioning

positive consequences strengthen behaviors to make them more likely in similar situations

- Instrumental Learning or trial and error
- Example cat learning to push a lever to get out of the box where she finds food.

Psychology of Behavior

Thorndike (1898): Instrumental conditioning

http://www.youtube.com/watch?v=BDujDOLre-8&feature=player_embedded

Psychology of Behavior

Skinner (1938):

Operant Conditioning: the process of learning behaviors from the environment through consequences.

- Positive reinforcement
- Negative reinforcement
- Punishment
- Chaining and shaping
- Reward schedule systems

reinforcement is the chances of increasing probability of behavior occurrence.

Operant Conditioning

- Primary reinforcers: e.g., food, has power to reinforce behavior
- Conditioned reinforcer: e.g., money, increase probability of behavior by association with primary reinforcer

Increase Behavior:

Action -> positive Reinforcer

+ive Reinforcement

Action -> no negative Reinforcer

-ive reinforcement

Operant Conditioning

- Primary reinforcers: e.g., food, has power to reinforce behavior
- Conditioned reinforcer: e.g., money, increase probability of behavior by association with primary reinforcer

Decrease Behavior:

Action -> negative reinforcer

+ive punishment

Action -> no positive reinforcer

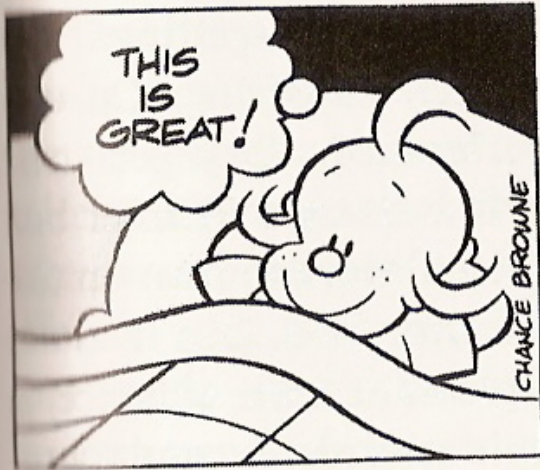
-ive punishment

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**“I wrote another five hundred words. Can I
have another cookie?”**

HI AND LOIS



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Comparison of Classical and Operant Conditioning

| | Classical Conditioning | Operant Conditioning |
|----------------------------|---|--|
| Response | Involuntary, automatic | Voluntary, operates on environment |
| Acquisition | Associating events; CS announces CR | Associating response with a consequence (Reinforcer or punisher) |
| Extinction | CR decreases when CS is repeated presented alone | Responding decreases when reinforcement stops |
| Cognitive Processes | Organisms develop expectation that CS signals the arrival of US | Organisms develop expectation that a response will be reinforced or punished |

Operant Conditioning

http://www.youtube.com/watch?v=AepqpTtKbwo&feature=player_embedded

So what about Video Games?

- <http://www.youtube.com/watch?v=nka-Mhp7fo>

Skinner Operant Conditioning (Class Assign)

- Watch BRAID, WORLD1 and look for Operant Conditioning behaviors (Voluntary behavior that operates on environment and expects response to rewarded or punished)
- <http://www.youtube.com/watch?v=LsCaN63YXM8&NR=1>

Super Mario & Conditioning Problem

- Super Mario
<http://www.youtube.com/watch?v=xkD7L2QFwRo>
- Super Mario Brothers 2
<http://www.youtube.com/watch?v=GrL3JcoisFo>
- Super Mario Lost levels
<http://www.youtube.com/watch?v=J7ergz9A5x0&feature=related>
- SUPER MARIO BROS 2: The Scandal & Review-
<http://www.youtube.com/watch?v=VdjYYFOGE3k>

Scheduling Reinforcers

- After behavior is learned
- Occurrence of reward after each behavior satiates the reward
- Different types of schedules work:
 - Fixed Ratio: reinforce after x times of action
 - Fixed Interval: reinforce after time interval
 - Variable Ratio: reinforce after x times where x is variable between some interval
 - Variable Interval: reinforce after time interval x where x is variable between some interval

Shaping Behaviors

Action_x -> positive outcome

Action₁ -> CS (positive) until conditioned

Extinction of CS positive

Action₂ -> CS (positive) until conditioned

Extinction of CS positive

Action_x -> CS (positive)

Chaining and Shaping

Action₁ -> Action₂ -> Action₃ -> positive
outcome

Action₃ -> CS (positive) until conditioned

Action₂ -> Action₃ -> CS (positive) until
conditioned

Action₁ -> Action₂ -> Action₃ -> CS (positive)

Why are we looking at this?

- Reward systems in games
- Tutorials
- Teaching the player about game system
- Raph Koster – connection between games and learning
- Addiction system

Any more?

Application in Games

- What are the rewards?
- How to schedule them?

Challenges:

- Rewards are all conditioned, so people like different things
- How to integrate schedule of different rewards?

Rewards/Punishments in Games

- Gameplay Rewards

help move player forward in the game, e.g.

- New weapon
- A Key
- New power

- Hidden Rewards

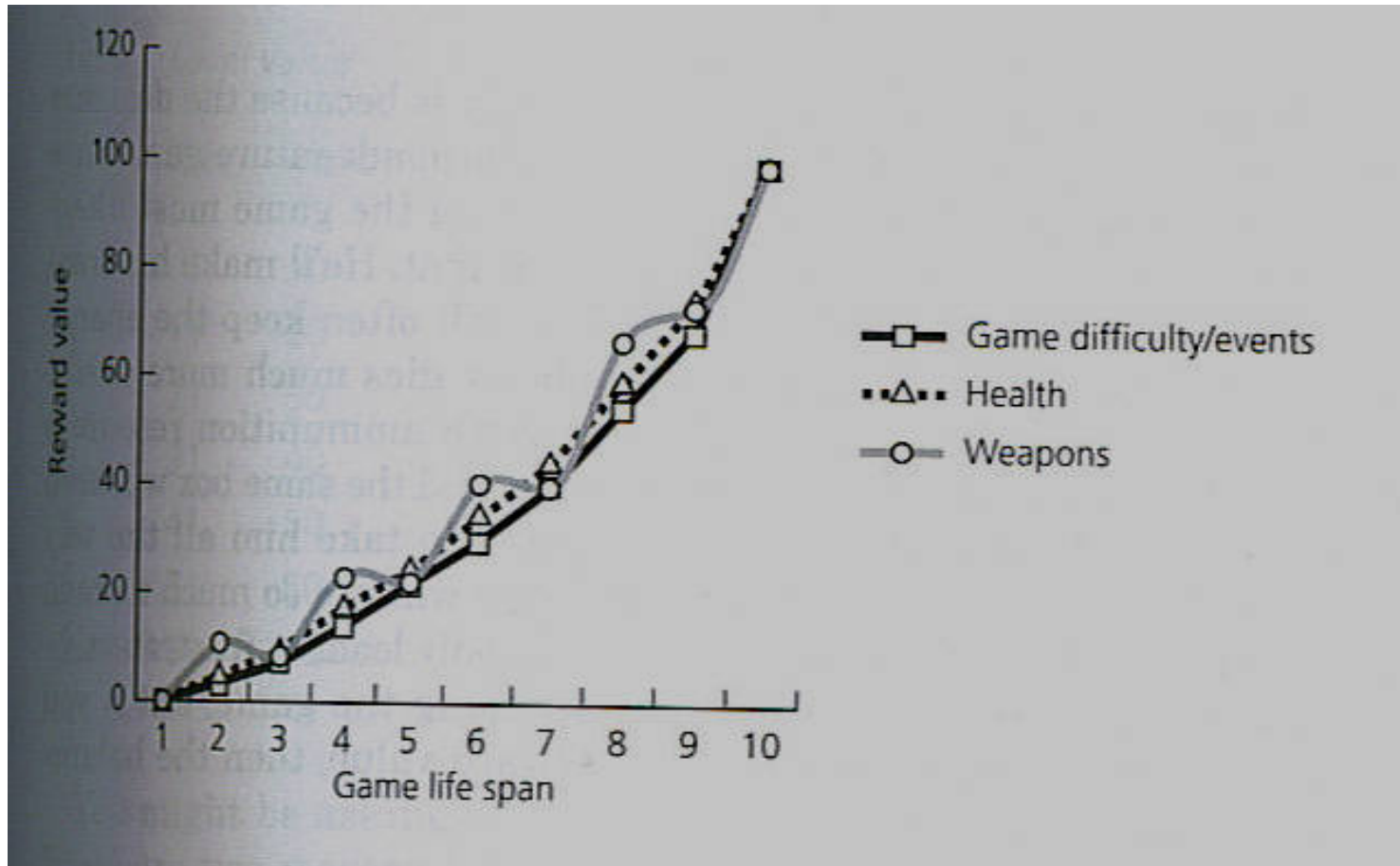
cannot count on player finding them

- Visual rewards
- Others?

Rewards/Punishments in Games

- Clearing a level and advancing to the next
- Solving puzzles
- Achieving goals
- Winning
- Gaining points
- Gaining powerups
- Acquisition of items
- Acquisition of skills, improving skills or stats
- Exploration
- Achieving a top score
- Status

Scheduling Rewards



Scheduling Rewards

- Ratio strain: the player loses interest due to effort required and the reward.
- Variable ratio schedule is used for level advancement
 - these schedules have the least susceptibility to ratio strain.
 - a schedule that shows the most resistance to extinction, produces no post-reinforcement pause, and which is the most effective at producing high levels of response over extended periods.

Reinforcement Schedules and Rewards in Briad (Class Assignment)

- **Braid, World3**

<http://www.youtube.com/watch?v=pcjbil1TMoo>